

## Integrating Bespoke IP Regimes for Quantum Technology into National Security Policy

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1 sentence synopsis: *The world needs articulated quantum-innovation policy mechanisms (tailored to the unique physics of the very small).*

### Abstract:

The adoption of applied quantum technologies by the markets raises cross-disciplinary questions about balancing their disruptive societal effects. It raises questions on how our innovation architecture should be constructed, so that benefits will be distributed equally and risks proportionally addressed. Responding to these challenges we find that policy makers should treat quantum as something unique and unprecedented, but should also learn from history.

In this light, we examine the need for an innovation mechanism tailored to the counterintuitive physical characteristics of quantum technology. Besides that, we find that it is useful to draw parallels between regulating neighboring fields, for many reasons.

From a cross-disciplinary lens, we connect quantum technology to fair competition and intellectual property, including patents and trade secrets. We consider waiving and pledging IP, democratizing essential technology and analyze quantum-startups' value appropriation strategies.

Some of the best startups in the development of quantum computers and communications systems have strongly relied on IP protection -including trade secrets about hardware and software- to raise funding from private investors. Yet we wonder whether key concepts and appliances in quantum that are currently enclosed, should be democratized to address tensions between equal access & winner-takes-all effects, and conflicts between openness & control.

We recommend building upon pluralistic innovation mechanisms tailored to adjacent fields such as AI, biotechnology, nanotechnology, semiconductors and nuclear, each characterized by a long investment and R&D phase coupled with uncertain outcomes and rewards, and a Pandora's Box of probabilities and unknown risks.

Given the political reality of a world divided in two tech blocks with incompatible ideologies, standards and values, plus the multiplied societal benefits and safety & security risks associated with dual use quantum technology, we suggest that countries should be able to treat quantum applications similar to fissionable materials.

In this spirit, we propose to integrate bespoke IP regimes into national security law. We conclude that we can effectively integrate quantum-specific IP regimes into national security policy by adding a new security exception to article 73 (B) iv TRIPS. This will give countries the [strategic] option to exclude quantum technologies from IP protection and suspend the enforcement of patent and trade secret rights, similar to fissionable materials.

In practice however, it may be harder to exclude quantum materials from IP protection as compared to fissionable materials as in that case most of the breakthroughs came directly from National Labs that are funded in a different way, often by governments spending public money. One fundamental difference is whether we want technological information disseminated widely or want it hidden. Ironically, while patents are supposed to disclose information, withholding or breaking patents has been suggested in the service of both goals.

This illustrates the importance of employing alternative incentive and reward systems to advance innovation within the quantum domain. Beyond IP, policy makers have an array of options to incentivize creative and technological progress, such as state funding, direct spending, competitions, subsidies, prizes, fines, labor mobility law, tax law, education, immigration policy, and attracting talent.

Lacking an innovation theory of everything, we attempt to formulate the correct questions on openness -including the rewards of open research and innovation- versus developer and user controls, before giving definitive, all encompassing answers. We end with an urgent call for further multidisciplinary research on the raised issues.